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CAMI Director Retires

AWARD FOR EXCELLENCE. Dr. Collins (left) receives the FAA Career Service Award from Federal Air Surgeon Dr. Jon L. Jordan at the retirement ceremony.

WILLIAM E. COLLINS, PHD, the Director of the Civil Aeromedical Institute for the past dozen years, retired from government service on January 3, 2001.

Dr. Collins was appointed Director in August 1989 following one year as both Assistant Director and Acting Director. His appointments came during a difficult period in the history of the Institute, and Dr. Collins was instrumental in significantly increasing CAMI funding and positions, particularly in the research areas, upgrading technical resources and the facility, and maintaining those gains, despite several major governmental reduction programs. He also initiated the Institute's successful drive to achieve "world class" status.

Dr. Collins' 1959 PhD from Fordham University was in experimental psychology. Following two years at the US Army Medical Research Laboratory in Fort Knox, Kentucky, he joined the FAA as a research psychologist and was named chief of the Aviation Psychology Laboratory in 1965. That laboratory later became a separate branch in 1986 and then a division in 1988 with a new title – Human Resources Research.

In addition to numerous FAA awards and the Department of Transportation Silver Medal for organizational achievements, Dr. Collins is an elected Fellow of the Aerospace Medical Association (AsMA), American Psychological Association, American Psychological Society, Aerospace Human Factors Association, American Association for the Achievement of Science, and the New York Academy of Sciences based on scientific contributions by publications, presentations, and films in areas of sensory psychology, spatial disorientation, and stressor effects on performance. His major research-based awards include the AsMA President's Citation and the Longacre and Moseley Awards, a Professional Excellence and President's Awards from the AsMA Life Sciences and Biomedical Engineering Branch, and the Hansen Award from the Aerospace Human Factors Association. He also is the recipient of the Oklahoma Psychologist Association's Distinguished Psychologist Award for professional excellence as well as awards for Federal Service contributions from the Oklahoma City Chapters

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The Federal Air Surgeon's Column

Medical Risks Associated With Air Travel

Cabin Air Quality, Communicable Diseases, Cosmic Radiation, Air Rage, Cramped Cabins, DVT... All Need Our Attention

Jon L. Jordan, MD, JD

HISTORICALLY, the responsibilities of the Office of Aviation Medicine have been limited largely to matters related to safety of flight. As a result, our efforts have been concentrated on assuring the medical fitness and safe operational performance of flight crewmembers and air traffic controllers.

While in-flight health issues affecting passengers and crew in air transportation have received attention, these issues have not been accorded the same level of importance. However it is clear that, while safety of flight will remain paramount, in-flight health issues will command greater emphasis in the future. This is exemplified by the current involvement of the Office of Aviation Medicine in a number of matters that, not so long ago, might have been considered outside the scope of our legislated authority.

As examples, we have experienced greater involvement in such issues as dissemination of communicable disease on board air carrier aircraft, alleged health risks associated with recirculated cabin air, exposure to cosmic radiation, and the provision of emergency medical assistance on board air carrier aircraft. In respect to the latter, readers may recall that the FAA issued a Notice of Proposed Rulemaking on May 24, 2000, that would require air carrier aircraft to be equipped with automated external defibrillators and enhanced medical kits. Comments received to this proposal have been reviewed, and the FAA will shortly be issuing a decision.

Although not yet considered an FAA problem, concern is being raised in medical circles — and by passengers — about the impact on passenger health of crowded air carrier cabin conditions on long flights. So-called "air rage" is a growing problem that, if nothing else, presents a physical safety concern for passengers. While it is likely that the phenomenon is related to multiple factors, cramped cabin conditions may play a role.

Causing concern most recently is the identification of cramped cabin conditions and long flights as possible causes or contributing factors to the development in passengers of deep vein thrombosis (DVT). Risk for the development of DVT is not unique to air travel. In several recently reported incidents, however, passengers on aircraft have sustained pulmonary infarcts and death from emboli linked to venous thrombosis. While the incidence of such events is unknown, the number of reported cases is increasing. In some instances, litigation is underway charging air carriers with negligence in failing to warn passengers about the dangers of prolonged inactivity and the possible development of DVT.

I think it's only a matter of time before the aviation medical community and the air carriers themselves will be called upon to significantly increase their activity in dealing directly with medical issues associated with air travel and to direct educational efforts on the flying public. Not only is there a need to educate patients about conditions that could adversely affect their own health, they must be educated on how their conditions could affect others. Virtually every day air carrier aircraft are diverted because of an ill passenger on board. While the need for many of these diversions could not be anticipated, all too often persons with known medical conditions board aircraft when they shouldn't, thereby placing themselves and others at significant inconvenience or risk to their health.

Some may think that regulation is an answer to the problem. I believe, however, that while regulation may sometimes be necessary, education is the key. In this respect, aviation medical examiners can play a vital aviation safety role not only in assessing the medical qualifications of airmen but also in educating patients about issues associated with air travel. It's in everyone's best interests.

JLJ

Federal Air Surgeon's Medical Bulletin

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Aeromedical Certification Update

Beyond Drug Screening

By Warren Silberman, DO, MPH

Abstract: The aviation industry drug-testing program, which covers airmen, screens for five drugs: marijuana, cocaine, opiates, phencyclidine (PCP), and amphetamines. The physician who is responsible for monitoring an airman who abuses a drug other than those listed cannot rely on the industry testing program to identify ongoing use of the drug.

Case Presentation

On **2/11/2000**, a Mitsubishi MU-2B-60, flown by a Part 135 operation, was destroyed when it impacted terrain approximately 1.5 miles east of a county airport. The aircraft had departed from a nearby airfield at 0723 and was en route to the airport near the accident site. The Mitsubishi was cleared for the ILS Runway 26 approach to the airport.

The ATC tower controller reported the airplane in sight approximately four miles from the airport. The pilot was given the option of landing on runway 26 or 29, and he chose to land on runway 29. At 0815, the winds were 300 degrees at 13 knots. Approximately two miles east of the airport, the pilot reported a dual engine flameout. The airplane impacted the ground near the top of a ridgeline. Visual meteorological conditions prevailed, and an Instrument Flight Rule flight plan had been filed.

On toxicological screening (performed at the FAA's Civil Aeromedical Institute), the airman was found to be positive for dihydrocodeine, hydrocodone, and diphenhydramine.

Back in 1982 or '83, the airman took some codeine tablets that his wife had been prescribed when he had developed some back pain. It supposedly made him "feel good." In August of 1994, he injured his back when he fell on an airport ramp . He began taking some codeine tablets that he wife had around for another condition that she was being treated for. By the time he saw someone, he was taking up to 8 Dihydrocodeine daily. The airman attempted to quit the drug "cold turkey" several times at this point but failed in his attempts.

He was working for a major airline at the time of this second episode in 1994. He self-referred for the abuse of narcotic analgesics in November 1994. He was treated by a psychiatrist from December 6, 1994, until January 30, 1995. His detoxification was rapid, uncomplicated, and successful. The Employee Assistance Counseling center at the airlines was informed of his problem and recommended monitoring for 24 months to include serial drug screening. The airman did not attend a regular inpatient treatment program, but he did very well in his monitoring and aftercare programs, so in July 1995 he was recommended to receive an Authorization for Special Issuance by the FAA.

A letter from a FAA psychiatric consultant noted that the pilot never tested positive on a random urine screen and had not tested positive since he had undergone treatment. On August 9, 1995, he was given a second-class medical certificate, with the stipulation that continued medical certification would be contingent upon total abstinence from the drug and submission to drug testing at least semi-annually. He retired from the airline in late 1996.

On 2/16/98, the airman's counselor sent the Aeromedical Certification Division (AMCD) a letter that recommended removing the airman from the regular follow up program. The letter specifically mentioned that there has been no evidence of a relapse. As a result, the AMCD sent the airman an eligibility letter and ceased the requirement for special follow up surveillance. The airman was informed that continued medical certification was contingent upon total abstinence from the illicit use of drugs.

Dihydrocodeine and hydrocodone are both semisynthetic narcotic analgesics. The medical literature reports plasma levels, but the levels obtained were, of course, post mortem blood. The dihydrocodeine and hydrocodone were both found in the urine. Their levels in blood were 2.665 and 0.054 mcg/mL, respectively. For the sake of argument, let's assume that the level of blood/plasma was approximately 1, since morphine has a ratio of 1.02. The level of Dihydrocodeine of 2.665 mcg/mL was significantly above therapeutic levels (0.07-0.2 mcg/mL in plasma). In addition, the level of Hydrocodone of 0.054 mcg/mL was above the therapeutic level of 0.018-0.032 mcg/mL in plasma.

Hydrocodone has several metabolites to include the alpha- and beta-stereoisomers of 6-hydrocodol. Alpha-6-hydrocodol is also known as dihydrocodeine. However, only approximately 3% of the hydrocodone is converted to the alpha and beta isomers. Thus, it appears that the Hydrocodone and Dihydrocodeine were taken as separate drugs and were not discovered as a result of metabolism.

It appears from review of the airman's case file that he might have been receiving most of his drug screen monitoring via a Department of Transportation testing laboratory. The aviation industry drug testing program screens for five drugs: marijuana, cocaine, opiates, phencyclidine (PCP), and amphetamines. Therefore, the tests could not pick up the drugs that this airman had in his system.

The important point to be made in this case is this: As an individual who might be called on to monitor an individual for drug abuse, you need to make sure that the laboratory tests for the drug of abuse. The FAA's Drug Abuse Monitoring Program should not be utilized to follow such an airman.

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Dr. Silberman manages the Civil Aeromedical Institute's Aeromedical Certification Division.

Immunizations and Flying

By Major Donato J. Borrillo, MD, JD

Abstract: *Immunizations are important tools in preventive medicine and should be encouraged by the AME. Since vaccines are not reportable upon medical certification, it is important for the AME to advise pilots regarding common side effects of the inactive vaccines and how they can affect aviation safety.*

AEROMEDICAL FOLKLORE describes the tragic death of Lieutenant **Sidney J. Brooks** from a delayed vaccine reaction. The unfortunate Cadet, for whom Brooks Air Force Base is named, reportedly died on his final solo flight after a series of vaccinations. Several unexplained aspects of Lt. Brooks' controlled flight into terrain still exist; however, his case exemplifies why the aviation medical examiner (AME) should be concerned with immunizations and flying. Furthermore, the recent use of Anthrax vaccine by the military has **unjustifiably** concerned pilots.

In general, immunizations are not disqualifying for general aviation flying. And although the Federal Aviation Administration (FAA) recently expanded Box 17(a) on Form 8500-8 to include "Any Medication," it was not their intent to include vaccine prescriptions. Pilots do not have to report receipt of any vaccine on their FAA medical application. It is, therefore, incumbent upon the AME to counsel the aviator on potential vaccine side effects and their affect on flight safety.

Vaccines come in two different forms, live and inactive. Live vaccines utilize weakened or dead organisms to stimulate an antibody response from the body. They are typically dosed once during childhood, and this provides long-term immunization. Examples of live vaccines include the varicella, oral typhoid, measles, mumps, and rubella vaccines. Pediatricians are usually concerned about the rare and debilitating side effects of a live vaccine; however, it is the inactive vaccine that concerns the AME.

Inactive vaccines have no live organisms and are more stable, but immunologically weaker. Because of this "weakness," they require multiple dosing. Examples of inactive vaccines include intramuscular typhoid, tetanus, influenza, and Anthrax . About 85% of adverse vaccine event reports concern relatively minor events — ordinary fevers or redness and swelling at the injection site. The remaining 15% describe serious events, such as seizures, high fevers, life-threatening illnesses, or deaths. Inactive vaccines are the type most likely administered to pilots and tend to have less serious side effects. Unfortunately, inactive vaccines have more common minor reactions than the live vaccines.

The National Childhood Vaccine Injury Act of 1986 (NCVIA) requires health care providers and vaccine manufacturers to report to the Department of Health and Human Services (DHHS) specific adverse events following the administration of vaccines. The DHHS established the Vaccine Adverse Event Reporting System (VAERS), which is co-administered by the Food and Drug Administration (FDA) and the Centers for Disease Control and Prevention (CDC), to accept all reports of suspected adverse events, in all age groups, after the administration of any US-licensed vaccine. The primary purpose for maintaining the database is to serve as an early warning or signaling system for adverse events not detected during pre-market testing. The AME should be aware of this database and be able to provide the airman with a general description of side effects from various vaccinations.

The most common minor side effect from parenteral vaccination with an inactive vaccine is local arm soreness, headache, fever, and fatigue. These seemingly minor symptoms on land could, of course, distract or physically limit the pilot in the air. Furthermore, since there is no minimum grounding period after receiving immunizations, it is incumbent upon the aviator to anticipate minor symptoms and plan crew rest accordingly. Taking aspirin or acetaminophen after an immunization may minimize minor side effects; whereas, more serious side effects may be temporarily "self" grounding until they resolve or stabilize. As always, pursuant to the Federal Aviation Regulations, it is the pilot's ultimate responsibility to be "fit for flight."

One final point: On 15 October 1999, Federal Air Surgeon Dr. **Jon Jordan**, posted a letter formally articulating the FAA policy on pilots receiving the Anthrax vaccine. The letter confirmed that receiving the Anthrax vaccine does not affect a pilot's medical certificate and confirmed that receipt of the vaccine is not cause for grounding for any duration. Individuals who have been immunized with the Anthrax vaccine are not disqualified from performing civilian airman duties so long as they do not experience significant side effects that would otherwise be considered disqualifying.

In sum, immunizations play a very important role in preventive medicine and should be encouraged by the AME. Since vaccines are not reportable upon medical certification, it is important for the AME to advise pilots regarding common side effects of the inactive vaccines and their impact on flight safety.

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Dr. Borrillo is the Chief of Flight Medicine, 352nd Operations Support Squadron, USAF Special Operations Command, Royal Air Force Base, Mildenhall, England. He is Board certified in Aerospace Medicine. In addition, he is a commercial pilot, an AME, and a practicing attorney.

Physician New CAMI Director

MELCHOR J. ANTUÑANO, MD, MS, has been selected as the manager of the Civil Aeromedical Institute (CAMI), replacing **William E. Colllins**, PhD, who retired January 3, 2001.

Dr. Antuñano

Since he joined the FAA in 1992, Dr. Antuñano has served as the manager of CAMI's Aeromedical Education Division, including a special assignment as acting manager of the Aeromedical Certification Division.

He has been the focal point in leading the activities of a professional, technical, and clerical team engaged in the policy development, planning, evaluating, and administering:

♦ a centralized program for the selection, designation, training, and management of about 5,700 Aviation Medical Examiners (AMEs) appointed to conduct physical examinations and issue FAA medical certificates to about 620,000 civil airmen throughout the US and in 93 countries worldwide,

♦ aeromedical education programs for FAA flight crews and the civil aviation pilots; programs include aviation physiology, global survival, and aviation human factors,

♦ aeromedical publications (aviation safety brochures, research technical reports, and the *Federal Air Surgeon's Medical Bulletin*) and other didactic materials (training manuals, multimedia products, presentation materials, etc.) used to disseminate aeromedical information to promote aviation safety, and

♦ a highly specialized library system in support of a broad range of aeromedical and aviation safety reference/research programs.

Born in Mexico City, Mexico, Dr. Antuñano is a graduate of the National Autonomous University of Mexico School of Medicine and completed post-graduate training in aviation medicine at the Mexican government's National Center of Aviation Medicine in Mexico City. He is a graduate of the Residency Program in Aerospace Medicine at the Wright State University School of Medicine in Dayton, Ohio. He was awarded a post-doctoral research fellowship by the US National Research Council of the National Academy of Sciences at the USAF School of Aerospace Medicine in San Antonio, Texas.

Dr. Antuñano presents a going-away gift to Dr. Collins.

Antuñano is credited with 264 scientific presentations at national and international conferences in aerospace medicine in the US and in 20 countries worldwide, and with 44 scientific articles covering a variety of aerospace medicine topics. He is Fellow and vice-president of the Aerospace Medical Association (AsMA), past president of the Iberoamerican Association of Aerospace Medicine, member and selector of the International Academy of Aviation and Space Medicine, president-elect of the Space Medicine Branch, honorary member of the Greek Aerospace Medical Association, honorary member of the Colombian Society of Aviation Medicine, charter member of the Aerospace Human Factors Association, member of the Mexican Society of Aviation Medicine, and a member of other national and international professional societies in aerospace medicine. He is a faculty member at Wright State University School of Medicine, at the Medical Sciences Division of Oak Ridge Institute for Science and Education, at the University of Oklahoma Health Sciences Center, and at the University of Texas Medical Branch.

Antuñano has received 46 awards and recognition (national and international) for his academic, administrative, and research achievements, including *DOT Secretary's Award for Meritorious Achievement: Silver Medal* granted by the Secretary of the US Department of Transportation for "outstanding accomplishments in promoting aviation safety in the US and abroad through aeromedical education"; *Outstanding Manager Award* granted (3 times) by the Office of Aviation Medicine; *Arthur S. Flemming Award,* from George Washington University for "outstanding accomplishments in the promotion of aviation safety in the US and abroad through the exercise of inspiring leadership and professionalism"; *John A. Tamisiea Memorial Award,* presented by the AsMA and the Civil Aviation Medical Association for "unique contributions to the aviation medical examiner activities through the introduction of innovative and creative teaching procedures for AMEs"; *Young Investigator Award,* given by AsMA's Space Medicine Branch for "authorship of the most outstanding paper by a young investigator"; and *Congressional Certificate of Recognition for Contributions to Improve Aviation Safety in Colombia Through Continuing Medical Education,"* granted by the Republic of Colombia's House of Representatives.

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The Heart's Got Rhythm…and Blues

Case Study, by Lt. Col. Ted Mickle, MC, PS

***Abstract**: Far more reliable than any aircraft powerplant ever designed by man, the heart flawlessly cycles over 100,000 times a day. However, should its precise rhythm be disturbed, the pilot is potentially seconds away from incapacitation or unconsciousness. This article discusses the types of heart rhythm disturbances that can occur during flight, and how they may affect a pilot's performance.*

Introduction

MOST OF THE PHYSIOLOGICAL processes of our bodies that enable us to carry on the activities of daily living are performed automatically, with amazing precision, and are so reliable that we are usually unaware of their presence or complexity. We take our health for granted until we experience a temporary (or permanent) loss of function of a key (and heretofore unappreciated) body function or component that leaves us unable to experience and enjoy life to its fullest.

Aviators perform many complicated and coordinated tasks while flying, all of which are dependent upon maximum alertness and responsiveness. While the functioning of all body systems may have either positive or negative affects upon the optimum functioning and level of consciousness, perhaps nothing can have the degree of immediate and adverse effects upon the functioning of the brain than disturbances in heart rhythm.

In aviation, however, factors such as altitude, speed, weather, and a complex three-dimensional working environment combine to place high demands upon pilots and their health. Any health condition that may occur without warning to deprive pilots of the ability to safely operate an aircraft, such as a cardiac arrhythmia, is an unacceptable risk, not only to their lives, but to the lives of others as well. However, not all cardiac arrhythmias carry the same risk to a pilot or might interfere with the safe operation of an aircraft. Under certain circumstances, the heart may beat too fast (a tachyarrhythmia) or too slow (a bradyarrhythmia) to provide adequate blood flow to the brain to maintain proper brain functioning. If mild, an arrhythmia may have little, if any, adverse effect upon a pilot and the safe operation of an aircraft. If more severe, the risk to a pilot and passengers rapidly mounts.

How prevalent are cardiac arrhythmias in the cockpit, and are cardiac rhythm disturbances a major problem among airmen? What are the public safety concerns of pilots with cardiac arrhythmias operating aircraft? The Federal Aviation Administration (FAA) is responsible for the medical certification of over 620,000 licensed airmen. Each day, the FAA Aeromedical Certification Division processes 1,900 medical certification/recertification applications. Less than 1% are ultimately rejected for certification on medical grounds. Each year, the Aeromedical Office of the Air Line Pilots Association receives inquiries from just over 40 pilots with cardiac rhythm disturbances. More than half of these airmen experienced loss of consciousness (LOC) from their arrhythmias, with five to ten in-cockpit LOCs each year from cardiac causes[1]. A survey by the International Federation of Airline pilots reports that temporary in-flight medical incapacitation is fairly common, with one-third of pilots relating medical problems during flight (mostly gastrointestinal) but with only a 3% incidence of overt safety concerns[2].

This is the salient information the FAA needs to have to evaluate an airman with a cardiac rhythm disturbance:

- The diagnosis of the particular rhythm disturbance
- Arrhythmia symptoms, if any
- The likelihood of an arrhythmia occurring
- The likelihood that arrhythmia will place a pilot and passengers at risk by causing incapacity or loss of consciousness
- The risk that the arrhythmia (or co-existing heart disease) represents over time
- How can airmen with potentially hazardous cardiac arrhythmias be identified during the medical certification process?

Major Types of Arrhythmias and Their Aeromedical Significance

Arrhythmias can affect the upper (supraventricular) chambers of the heart (the atria, which act as the heart's "pacemaker" and are also responsible for "priming" the ventricles), the lower chambers of the heart (the ventricles, which are the main pumping stations responsible for forcing blood to all areas of the body), or commonly, both upper and lower chambers simultaneously. Cardiac arrhythmias may occur due to an occasional heartbeat firing prematurely in the cardiac cycle. As long as these premature beats are infrequent and do not adversely affect the overall pumping function of the heart, they are not considered problematic. However, heart rates too fast to allow proper pumping function of the heart or too slow to produce an effective cardiac output can result in a variety of symptoms, ranging from mental confusion to loss of consciousness to sudden death.

Continued ➤

Lt. Colonel Mickle is an active-duty Air Force flight surgeon selected to command the 6th Aerospace Medicine Squadron at MacDill Air Force Base, Florida. He is a fellow of the American Academy of Family Physicians and a diplomate of the American Board of Family Practice.

Ventricular Arrhythmias

Premature Ventricular Contractions (PVCs) are premature beats originating in the ventricles. They are fairly common in healthy individuals and may be precipitated or exacerbated by caffeine, stress, or by medications used to treat nasal congestion. However, if frequent or occurring from more than one area in the ventricles, or occurring in groups of three or more at a time, PVCs may indicate underlying heart disease.

Ventricular Tachycardia (V-Tach): a rapid rhythm with a sudden onset originating in the ventricles. V-Tach usually results in abnormally low cardiac output. Individuals with V-Tach may experience symptoms ranging from weakness, shortness of breath, mental confusion, and faintness to sudden loss of consciousness. V-Tach is usually caused by heart disease, and it requires emergency intervention if it persists for more than a few moments.

Ventricular Fibrillation (V-Fib) is a chaotic rhythm with sudden onset originating in the ventricles resulting in no cardiac output. Loss of consciousness is immediate, and death soon follows unless emergency cardiac care (CPR and electrical shock therapy) is rapidly administered. Most cases of sudden cardiac death result from V-Fib.

Supraventricular Arrhythmias

Atrial Tachycardia is a rapid rhythm originating in the atria, usually due to chronic disease processes. Not as dangerous as ventricular tachycardia. Multifocal atrial tachycardia is a variant of atrial tachycardia that results from lung disease.

Atrial Fibrillation is an irregular heart rhythm, usually rapid at onset, originating in the atria. Atrial fibrillation is the most common supraventricular arrhythmia in the aviation population. Causes of atrial fibrillation include hyperthyroidism, heart valve abnormalities, and dilation of the atria. Dizziness, shortness of breath, mental confusion, or loss of consciousness may occur with atrial fibrillation if the ventricular response is too rapid or too slow.

Paroxysmal Supraventricular Tachycardia (PSVT) is a rapid heart rhythm of sudden onset. It is more benign than the other tachycardias; PSVT may be self-terminated (for example, by performing the Valsalva maneuver).

Pre-excitation Tachyarrhythmias

Wolff-Parkinson-White (WPW) syndrome is the best-known example. WPW is usually benign but may result in loss of consciousness in 25% of cases.[3] Those with WPW who are ordinarily symptom-free rarely experience sudden cardiac death.[4]

Bradyarrhythmias are slow heart rates defined as having a rate less than sixty beats per minute. Athletes and other aerobically fit individuals may commonly have heart rates in the 40-60 beats per minute range and experience no symptoms whatsoever. Bradyarrhythmias are only a concern if they result in symptoms (i.e., dizziness, faintness, and loss of consciousness). Bradyarrhythmias with symptoms (especially if due to heart disease) may require the implantation of a permanent pacemaker to maintain a uniformly effective heart rate and cardiac output.

Cardiac impulse conduction defects (such as Type II second-degree and third-degree atrioventricular [AV] blocks, right and left bundle branch blocks, and fascicular blocks [also known as hemiblocks]) may represent prior or ongoing damage to the heart's main impulse conduction system. They are noteworthy in that, should further damage occur to the heart's conduction system, impulses meant to generate a heartbeat might not be conducted, with a dangerously slow heart rate resulting. The placement of a permanent pacemaker may be required, especially in the setting of a high-grade AV block, which produces a symptomatic bradyarrhythmia.

Neurally-Mediated Syncope (loss of consciousness). Examples are vasovagal syncope and carotid sinus syncope. Vasovagal syncope is the most common cause of a common faint, which may be precipitated by prolonged standing, anxiety, hot environments, receiving an injection, etc. Neurally mediated syndromes become a significant problem if they become frequent, occur without warning, and result in near or total loss of consciousness.

FAA Medical Review Branch Guidelines

The FAA Medical Review Branch has published the following guidelines[5] to guide aviation medical examiners and the FAA Aeromedical Certification Division in determining whether or not to restrict airmen with a history of cardiac arrhythmias from performing flying duties:

Ventricular Arrhythmias

Premature Ventricular Contractions. A history of more than six

Continued on page 10...

[1] Epstein AE, Miles WM, et al. Personal and public Safety Issues Related to Arrhythmias That May Affect Consciousness: Implications for Regulation and Physician Recommendations. *Circulation*. 1996;94:1147-66.

[2] Bennett G. Medical-cause accidents in commercial aviation. *Eur Heart J*. 1992;13 (supplement H):13-15.

[3] Paul T, Guccione P, Garson A Jr. Relation of syncope in young patients with Wolff-Parkinson-White syndrome to rapid ventricular response during atrial fibrillation. *Am J Cardiol.* 1990;65:318-21.

[4] Yee R, Klein GJ. Syncope in the Wolff-Parkinson-White syndrome: incidence and electrophysiologic correlates. PACE Pacing *Clin Electrophysiol*. 1984;7:381-8.

[5] Federal Aviation Administration. Civil Aeromedical Institute. *Aeromedical Certification Reference Manual*. Oklahoma City, OK. Revised June 1999. 34 pages.

"But My Doctor Said...!"

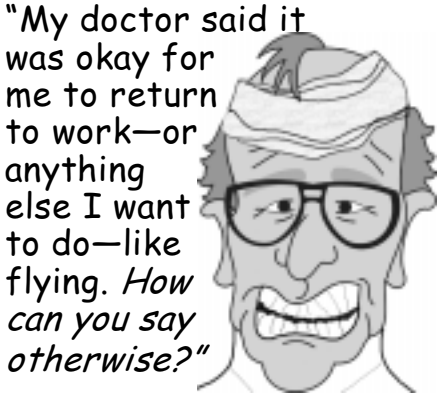
by G.J. Salazar, MD
Southwest Regional Flight Surgeon

Abstract: The recommendation by an individual's private physician to return to full activities of daily life does not automatically imply a return to aviation-related activities. There is a simple explanation: the inherent physiologic requirements of flight, the dire consequences of sudden incapacitation in the aviation environment, and applicable regulations.

AVIATION MEDICINE physicians frequently hear this complaint from pilots and air traffic controllers. The usual context for voicing this concern is when an airman medical certificate or some other type of medical clearance was not issued, even though the individual's private physician may have stated the person was fit for work or to fly.

Understandably, this difference of opinion can be confusing to individuals needing medical clearance to fly or control air traffic. The underlying premise for occasional differences of opinion is fairly simple and easy to explain.

To understand this issue, lay persons — and even medical providers — have to be reminded that the practice of aerospace medicine is, itself, a medical specialty. Just like physicians in internal or family medicine, pediatrics, gynecology, or a host of other medical disciplines, practitioners of aerospace medicine are medical specialists. They have received years of specialized training and have taken certification examinations to demonstrate their proficiency in this medical discipline. Civilian physicians who are not aerospace medicine specialists but who have been designated by the Federal Aviation Administration (FAA) to do flight physicals, (i.e., aviation medical examiners, or AMEs) also have had additional training on the unique aspects of aviation medicine and physiology.



In addition to the clinical issues associated with aerospace medicine, there are aspects of compliance with the applicable Federal Aviation Regulations for pilots and non-FAA air traffic controllers. Similarly, FAA controllers must meet and comply with applicable Agency medical policies and regulations. Non-aviation physicians are largely unaware of these administrative requirements or of all the clinical issues that pertain to the aerospace environment.

When a private physician clears a patient to return to work after experiencing a particular medical condition, that physician's frame of reference for "work" is generally in a non-aviation context. Yes, that individual may be fit to do some type of work four to six weeks after a heart attack, but unfortunately, is not ready to pilot an aircraft or control air traffic. The rationale for this premise centers primarily on the inherent physiologic requirements of flight, the dire consequences of sudden incapacitation in the aviation environment, and applicable regulations. This also applies to a host of other medical diagnoses and conditions. The recommendation to return to full activities of daily life does not automatically imply a return to aviation-related activities.

Applicable medical aviation regulations/guidelines and clinical aerospace medicine decisions take into account the risks to safety posed by a variety of clinical conditions. These risks typically may not be issues of concern in non-aviation professions; however, they often lead to clinical and regulatory differences of opinion as to when an individual may return to aviation duties. Given the clinical and physiological variations in individuals, aeromedical clearance decisions may be handled very differently, although outwardly, cases may appear to be similar.

Aerospace medicine specialists and AMEs are entrusted with the responsibility for aeromedical certification. In this capacity, they have a responsibility to educate non-aviation medicine physicians regarding reasons for additional concern in their patients who are pilots and/or controllers. Also, they must spend additional time ensuring aviation personnel understand the impact their medical condition could have on aviation safety. It is in the best interests of all involved that pilots and air traffic controllers who are temporarily medically incapacitated be treated and returned to work as promptly as possible. However, we must also ensure that an individual be medically cleared only if they do not represent a risk to the safety of the national airspace system. Aviation medicine physicians must work closely with the patient's doctor, but ultimately, they must make the decision for return to aviation activities, since they are the most knowledgeable of the potential adverse consequences.

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This Information With
Your Staff and Patients

Ulcerative Colitis

Case Study

By Leonid M. Katkovsky, MD

Abstract: *Active ulcerative colitis may preclude issuance of a medical certificate. An authorization for special issuance can be granted in well-controlled, inactive ulcerative colitis. The medical certificate would be time-limited for a period of 1 year and require that the airman give the FAA a current status of his medical condition at that time.*

Background

A 43 YEAR-OLD FIRST OFFICER of a major commercial airline submitted a new application for a first-class medical certificate. He had a long history of ulcerative colitis, which was quiescent until early January 2000. While in flight training, he developed shortness of breath and tachycardia. His local physician noted a hematocrit of 27 and iron level of 5. The applicant was immediately started on Asacol, Prednisone, Ciprofloxacin, and oral iron. There was a rapid improvement of symptoms. He did not lose any weight. After 2 months of treatment his hematocrit returned to normal.

History and physical exam. On 1/12/00, the applicant complained of relative weakness and low energy level, watery bowel movements, usually 8 to 10 (or more) per day, sometimes with gross blood in them. Sometimes he had nocturnal bowel movements. His weight was 174 lb. There was no evidence of any muscle wasting. The abdomen was flat and benign. The rectal exam revealed a stricture just above the anal verge. The guaiac test was positive. Colonoscopy and sigmoidoscopy were not performed at this time; however, a colonoscopy on 10/22/00 had shown mucosal changes, such as a granular, friable, erythematous appearance, blunted/blurred vascular pattern, retraction, stricturing, loss of the interhaustral fold pattern, a tubular appearance, multiple pseudopolyps, and rectal involvement, which was continuous and symmetric.

Pathologic diagnosis. Chronic inactive colitis of the cecum, left colon and transverse colon, inflammatory pseudopolyp and normal mucosa of

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Ulcerative Colitis

...is one of inflammatory bowel diseases, characterized by unknown ethiology. Since there are no pathognomonic features or specific diagnostic tests, these disorders remain diagnoses of exclusion. Ulcerative colitis and Crohn's disease share many common characteristics. These diseases are more common in whites than in blacks and orientals with an increased incidence in Jews, with genders equally affected. While the cause of ulcerative colitis is unknown, genetic, infectious, immunologic, and psychologic factors have a significant importance. Pathologically, in ulcerative colitis there is an inflammatory reaction that primarily involves the colonic mucosa. The colon appears ulcerated, hyperemic, and usually hemorrhagic. A striking feature of the inflammation is that it is uniform and continuous with no intervening areas of normal mucosa. The rectum is involved in 95% of cases. The terminal ileum is minimally involved, referred to as "backwash ileitis." Progressive epithelial damage leads to multiple ulcerations. There are characteristic small crypt abscesses with their eventual destruction.

In severe ulcerative colitis, as seen with toxic megacolon, the bowel wall may become extremely thin, the mucosa denuded with inflammation extending to the serosa leading to dilatation and subsequent perforation. Characteristic features of chronicity are fibrosis, shortening of the colon, smooth, "lead-pipe" radiological appearance of the colon, pseudopolyps, and dysplasia of the surface epithelium.

Clinically, ulcerative colitis presents with bloody diarrhea and abdominal pain, often with fever and weight loss in more severe cases. With predominantly rectal involvement, constipation, rather than diarrhea is present, and tenesmus may be a major complaint.

Physical exam is nonspecific, normal, or with some abdominal distention or tenderness along the colon. The laboratory findings are nonspecific. The majority of patients suffer a relapse within a year of the first attack; 85% of patients will have mild or moderate disease that is manageable without hospitalization. In approximately 15% of patients, ulcerative colitis assumes a more fulminant course, with a risk to develop toxic dilatation and perforation, which represents a medical emergency.

The diagnosis of ulcerative colitis should be entertained in all patients presenting with diarrhea or bloody diarrhea, persistent anal sepsis, and abdominal pain. Radiologic evaluation with barium enema is essential in the diagnosis of ulcerative colitis . Colonoscopy is an additional excellent diagnostic tool, allowing direct visualization and biopsy of any colonic area. It is necessary to differentiate ulcerative colitis from hemorrhoids, neoplasms, colonic diverticula or arteriovenous malformations, radiation and acute proctitis, amebiasis, acute bacillary dysentery, venereal diseases, Crohn's disease, pseudomembranous colitis, ischemic colitis, and irritable bowel syndrome.

Treatment of ulcerative colitis is primarily medical, which includes anti-inflammatory agents, Sulfasalazine and adrenal corticosteroids. Surgery is reserved for (1) specific complications and (2) intractability of disease.

Dr. Katkovsky was a resident in aerospace medicine at the Civil Aeromedical Institute when he wrote this article.

The Heart (from page 7)

PVCs per minute present on a resting EKG, or if the PVCs are causing symptoms. The airman should receive a complete cardiovascular evaluation, a 24-hour Holter monitor test, and maximal Bruce Protocol stress test. If no cardiac disease is found, medical certification may be granted. Multi-focal PVCs may also require cardiac treadmill stress testing and follow-up current status reports.

Ventricular Tachycardia. A history of sustained ventricular tachycardia is disqualifying.

Ventricular Fibrillation. A history of ventricular fibrillation, which is defined as lasting at least 30 seconds, is disqualifying.

Supraventricular Arrhythmias

Multifocal Atrial Tachycardia. This is disqualifying due to underlying heart and lung disease.

Atrial Fibrillation. Not disqualifying if the heart rate is controlled and the airman is not at risk for the formation of blood clots. If the applicant is proven to have atrial fibrillation secondary to untreated valvular heart disease, this too is disqualifying.

Paroxysmal Supraventricular Tachycardia. Not disqualifying if the heart rate is controlled.

Pre-excitation Tachyarrhythmias. Disqualifying, if there is a history of tachyarrhythmia or if structural heart disease has been detected by a complete cardiovascular evaluation, including a treadmill stress test and 24-hour Holter monitor.

Bradyarrhythmias and Conduction Defects

High-grade Atrioventricular Blocks. Disqualifying if pacemaker dependent.

Right Bundle Branch Blocks. If the applicant is over the age of 30, it requires a complete cardiovascular evaluation to include a radionuclide stress test.

Left Bundle Branch Blocks. Airmen of all ages require a complete cardiovascular evaluation to include a radionuclide perfusion study.

Conclusion

Cardiac rhythm disturbances can range in severity from being harmless irregularities in the heart's rhythm to serious events that can leave a pilot unconscious or incapacitated in seconds. Both the pilot and the FAA have vital interests in determining the nature and severity of a cardiac rhythm disturbance, and accurately determining it the pilot can safely operate an aircraft.

Meetings Calendar

International Events of Interest for 2001

Mar. 24, Sacramento, Calif.
Update in Gastroenterology for the Primary Care Physician. Info: UC Davis School of Medicine, Office of Continuing Medical Education, Room 1020 Camellia Cottage, UC Davis Health System, 2315 Stockton Blvd., Sacramento, CA 95817; Phone: (916) 734-5390; FAX: (916) 734-8966; Web site: web.ucdmc.ucdavis.edu/edu

May 6-10, Reno, Nev.
Aerospace Medical Association's Annual Scientific Meeting. Info: AsMA, 320 South Henry Street, Alexandria, VA 22314-3579; Phone: (703) 739-2240; FAX: (703) 739-9652; Web site: www.asma.org.

June 25 – 27, Jerez de la Frontera, Spain.
FAI International Symposium on Air Sports Medicine. Contact: Dr. Pedro Ortiz; Phone: 34-91-587-3948; FAX: 34-91-345-1908; E-mail: portizg@nexo.es; Web site: www.fai.org/medical/wag_symposium.asp.

Colitis (from page 9)

the right colon, chronic active colitis of the sigmoid, and pseudopolyp formation at the distal sigmoid.

Medications. Applicant currently takes Asacol 2 gm daily and a tapering dose of Prednisone, most recently 15 mg.

Management plan. This includes clearance to return to unrestricted activity since 1/00 and consideration of a total colectomy with ileoanal anastomosis.

Disposition. Active ulcerative colitis may preclude issuance of a medical certificate. An authorization for special issuance can be granted in well-controlled, inactive ulcerative colitis. The medical certificate would be time-limited for a period of 1 year and require that the airman give the FAA a current status of his medical condition at that time. If the airman were to undergo the proposed surgical procedures, he would have to report this to the FAA and ground himself until he heard from them. The requirement would be that he would be able to take care of himself with no limitations to lifting, etc., and have no side effects of the surgery. Prednisone use, itself, imposes restrictions. Prednisone is not permitted in civil aviation if the dose is greater than 20mg because of potential side effects (for example, confusion) that would be contraindicated in aviation duties.

References

Glickman RM. Inflammatory bowel disease: Ulcerative colitis and Crohn's disease. In: Braunwald E, Isselbach KJ, Petersdorf RG, Wilson JD, Martin JB, Fauci AS (Eds.), *Harrison's Principles of Internal Medicine*. 11th ed. McGraw-Hill, Inc:1987; pp. 1277-90.

1999 Guide for Aviation Medical Examiners. October 1999, p. 27.

Silberman W, Boren H, personal communications. FAA Aeromedical Certification Division, CAMI, March 29, 2000.

Recurrent AME Staff Training No Longer Mandatory

By Douglas Burnett

AVIATION MEDICAL EXAMINERS (AMEs) may now choose whether or not to require Medical Certification Standards and Procedures Training (MCSPT) for staff members. Errors of omission and typing errors on FAA Form 8500-8 have been decreased due to the on-line editing function of the new AMCS/DIWS.

Also, since AMEs are responsible for the quality of their airman medical exams, including all relevant documentation, the Federal Air Surgeon has decided that the need for staff training should be determined by the AME. MCSPT will continue to be made available, and is still highly recommended, but will be removed from FAA Order 8520.2E, as a requirement for continued designation as an AME. MCSPT will continue to be required for new AMEs and staff prior to designation, but only once in their AME careers.

The course (MCSPT) was developed to assist AME staff in reducing errors on FAA Form 8500-8, to teach them to quality check their AMEs exams prior to sending them to the Aeromedical Certification Division, and to train them on FAA security measures required for handling and administering the form. The quality check and security procedures remain relevant, but many staff members have years of experience with these procedures and may not require recurrent training.

To order MCSPT, contact:

Sharon Holcomb

(405) 954-4829; FAX (405) 954-8016;

e-mail:

Sharon_ctr_Holcomb@mmacmail.jccbi.gov.

The course is also available on the Internet at www.cami.jccbi.gov. Click MCSPT for the course and MCSPT Critique & Test when the course is completed.

The course companion videotape, "Fifteen Disqualifying Conditions," featuring Billy Ray Pilot and Dr. Feelgood, is currently only available in VHS video cassette (contact Sharon Holcomb). ✈

AME TRAINING

Aviation Medical Examiner Seminar Schedule
2001

February 23 - 25	Houston, Texas	AP/HF (2)
March 19 - 23	Oklahoma City, Okla.	Basic (1)
April 20 - 22	McLean, Va.	OOE (2)
May 6 - 10	Reno, Nev.	AP/HF (3)
May 21 - 25	Oklahoma City, Okla.	Basic (1)
June 11 - 15	Oklahoma City, Okla.	Basic (1)
July 20 - 22	Atlanta, Ga.	N/NP/P (2)
August 24 - 26	Salt Lake City, Utah	CAR (2)
September 10 - 14	Oklahoma City, Okla.	Basic (1)
October 26 - 28	Charleston, S.C.	OOE (2)
December 3 - 7	Oklahoma City, Okla.	Basic (1)

CODES

AP/HF --- Aviation Physiology/Human Factors Theme

CAR ------ Cardiology Theme

OOE ----- Ophthalmology - Otolaryngology - Endocrinology Theme

N/NP/P -- Neurology/Neuro-Psychology/Psychiatry Theme

(1) A 4½-day basic AME seminar focused on preparing physicians to be designated as aviation medical examiners. Call your regional flight surgeon.

(2) A 2½-day theme AME seminar consisting of 12 hours of aviation medical examiner-specific subjects plus 8 hours of subjects related to a designated theme. Registration must be made through the Oklahoma City AME Programs Branch, (405) 954-4830, or -4258.

(3) A 3½-day theme AME seminar held in conjunction with the Aerospace Medical Association (AsMA). Registration must be made through AsMA at (703) 739-2240.

The Civil Aeromedical Institute is accredited by the Accreditation Council for Continuing Medical Education to sponsor continuing medical education for physicians.

Office of Aviation Medicine *NEWS*

New Assistant RFS Selected in Southwest Region

By G.J. Salazar, MD

We want to warmly welcome **Denise L. Baisden**, M.D., to the Federal Aviation Administration. In September of this year, Dr. Baisden became the new Assistant Regional Flight Surgeon for Southwest Region in Fort Worth, replacing Dr. **Leo P. Leonelli,** who retired.

Dr. Baisden comes to the Agency from NASA. She joined NASA as a Flight Surgeon in 1989, and in 1995 she became the Chief of Flight Medicine at the Johnson Space Center in Houston. She held that position until her departure this year. Prior to joining NASA she worked as a Medical Officer with Krug Life Sciences in Houston from 1988 to 1989. She is a 1985 graduate of the Marshall University School of Medicine in Huntington, WV, and did a Residency in Family Practice, also at Marshall University from 1985 to 1986. Additionally, she completed the Residency program in Aerospace Medicine at Wright State University 1988 and in 1992 was Board Certified in Aerospace Medicine by the American Board of Preventive Medicine. Dr. Baisden is a Fellow of the Aerospace Medical Association (AsMA) and a member of that Association's Council. She is a past president of ASMA's Space Medicine Branch and currently is the president of the Society of NASA Flight Surgeons. Dr. Baisden is also a private pilot, with single-engine and instrument ratings.

Dr. Leonelli retired in September 30, 2000, as the Southwest Region's Assistant Regional Flight Surgeon. He had worked there since 1992 after transferring from the Western-Pacific Region in Los Angeles. Dr. Leonelli had been with the FAA for a little over ten years and has spent more than 45 years in the practice of medicine. Dr. Leonelli and his wife, Ruthie, will primarily reside in Southern California, where most of their eight children and numerous grandchildren live. We wish him the best on a well-earned retirement.

Dr. Salazar is the Southwest Region's Flight Surgeon.

Dr. Collins *(from page 1)*

of Federally Employed Women and the Federal Executive Council. For 20 years, he contributed his writing skills to AsMA as an associate editor of its monthly magazine, *Aviation, Space, and Environmental Medicine*.

Dr. Collins made five appearances before subcommittees of the US House of Representatives. He also was a twice-elected chair of the Oklahoma State Board of Examiners of Psychologists and holds an appointment as an Adjunct Professor in the Department of Psychiatry and Behavioral Sciences at the University of Oklahoma. His university contributions include chairing 11 and serving as a member of 13 other graduate thesis/dissertation committees.

W.E. Collins, PhD

Speaking at Dr. Collins' retirement ceremony, Federal Air Surgeon Dr. **Jon Jordan** noted that Dr. Collins' retirement was a "bittersweet time" to him, personally, because of the CAMI director's many achievements during a distinguished 41-year career. "When you were appointed Director of the Civil Aeromedical Institute in 1989," Dr. Jordan said, "you accepted a major challenge. While CAMI had great potential, it was in need of dynamic and effective leadership. You accepted the challenge with enthusiasm and energy and provided the leadership necessary to make the Institute what it is today. Having achieved world leadership in airman medical certification, aeromedical education, and aeromedical and human resources research, and by establishing the core for a strong occupational health organization, you are leaving a legacy of extraordinary value. Through sound and judicious employee selection and outstanding organizational management, you have provided the Office of Aviation Medicine and CAMI with the greatest possible likelihood for future success."

In presenting the prestigious FAA Career Service Award to Dr. Collins, Dr. Jordan added, "On behalf of all the employees of the Office of Aviation Medicine, I wish to thank you not only for your years of personal professional dedication to aviation and your contributions to public safety but for leaving the FAA with a strong and healthy CAMI."

For his part, Dr. Collins summed up by saying, "It's been a privilege to have been associated with Dr. Jordan and to have worked at CAMI. It's been particularly rewarding for both of us to see CAMI rise to world-class status in so many ways and to know that its global influence will increase markedly during the next decade."

Continued ➤

New RFS in Eastern Region

Harriet Lester, MD, has been selected to fill the Eastern Regional Flight Surgeon position. Dr. Lester is a Cum Laude graduate of Cornell University and the New York University School of Medicine, and she is certified by the American Board of Ophthalmology.

The new Regional Flight Surgeon replaces Dr. **Nicholas Lomangino**, who accepted a position as Deputy Manager of the Medical Specialties Division at headquarters.

"I believe Dr. Lester will be a fine Regional Flight Surgeon," says Deputy Federal Air Surgeon Dr. **Fred Tilton**. "She will be an excellent addition to the Eastern Region, the Office of Aviation Medicine, and the FAA. When Dr. Lester reports for duty in February, please join me in welcoming her to our organization." She will begin work on February 12, 2001.

Former FAAers Join Medical Board

Three former FAA employees are joining a new board of aviation medical advisors being formed by the Aircraft Owners and Pilots Association.

Included in the eight-member board are Dr. **Audie Davis**, former manager of the FAA Aeromedical Certification Division, Dr. **Stanley Mohler**, former chief of the Civil Aeromedical Institute and Aeromedical Applications Division, and **Kathleen Yodice**, former litigation/policy counsel for the FAA.

FAA Federal Air Surgeon Dr. **Jon Jordan** said he wants to consult frequently with the board, which will address medical issues of concern to general aviation pilots.

In Memory of Former OAM Staffers

Homer L. (Rick) Reighard, MD, former Federal Air Surgeon, passed away on October 1, 2000, at the age of 75. Dr. Reighard had served the Office of Aviation Medicine for 31 years and aviation medicine for more than 50 years.

Dr. Reighard joined the Civil Aeronautics Administration, the predecessor agency of FAA in 1953 and worked in various positions until he was named as Federal Air Surgeon in 1975. Among his achievements, he developed the first major revision of medical standards since they were adopted in 1926 and he began the first formal medical investigation of fatal aircraft accidents in 1959.

Reighard retired from the FAA in 1984 and served both government and the airline industry as a medical review officer in the drug testing program, and he was a consultant on aviation medical matters.

Jerry R. Hordinsky, MD, former manager of the Civil Aeromedical Institute's Aeromedical Research Division, passed away on October 20 after a long illness. He had retired in early 1999 after 17 years with the Institute. Dr. Hordinsky was 59. (For information about Dr. Hordinsky's career, see the Summer 1999 *Bulletin*, p. 13.)

Dr. Alan Completes International Visitor Program

After 12 months of active involvement in the various programs at the FAA Civil Aeromedical Institute, Dr. **Mustafa Alan**, Chief of Aeromedical Training, Department of Aerospace Medicine, Gulhane Military Medical Academy of the Turkish Army, completed his participation in the FAA International Exchange Visitor Program. Through this program, qualified specialists from foreign civil aviation organizations can enter the US for periods of up to 2 years to conduct studies and/or exchange information and expertise at FAA facilities and at a minimum cost to the agency.

Under the mentorship of Dr. **Melchor Antuñano**, Manager of the Aeromedical Education Division, Dr. Alan was exposed to the functions and responsibilities of the FAA Office of Aviation Medicine as they relate to the promotion of aviation safety. Dr. Alan participated in the day-to-day activities at CAMI, shared his specialized knowledge and skills with FAA's specialists in support of various operational programs, and received the benefits of interacting with FAA professional and technical personnel at a leading civil aviation medicine institute.

The FAA Office of Aviation Medicine supports international programs, such as this, that promote interaction between aviation medicine professionals, enable exchange of scientific information, and promote the FAA's leading role in civil aviation medicine worldwide.

Available on the Web

Visit the Civil Aeromedical Institute's Web site to read:
- √ current and back issues of the *Bulletin*
- √ editorials by the Federal Air Surgeon
- √ *downloadable* directory of aviation medical examiners
- √ great links to aviation-related websites
- √ full-text issues of OAM technical reports
- √ free MEDLINE from the National Library of Medicine
- √ Free Flight Human Factors Page

much more at the URL:

http://www.cami.jccbi.gov

Diabetes: When Your Blood Sugar Takes Off

by Glenn R. Stoutt, Jr., MD, Senior FAA Aviation Medical Examiner

"The purpose of this article is not how to treat diabetes once it has been diagnosed....We need to learn how best to prevent the development of type 2 diabetes."

Of the estimated 16 million people with diabetes in the United States, over five million are still undiagnosed with this (like hypertension) "silent killer." It is the seventh leading cause of death.

Diabetes simply means that your blood sugar is too high. All cells in our body use sugar (as glucose) for fuel. This sugar is made from most of the foods we eat, especially carbohydrates. *Before glucose gets into the cells, the hormone insulin—made in the pancreas—must be present.* Otherwise the glucose levels rise in our blood, depriving our body of essential fuel. If a high blood sugar persists, the tiny arteries throughout all tissues become weakened and clogged. The blood flow causes irreparable damage to vital structures such as our nerves (neuropathy), heart, brain, eyes, gums, teeth, and kidneys. Diabetes is a leading cause of stroke, heart attack, kidney failure, blindness (the leading cause of blindness in ages 20-70), impotence, gangrene and amputation. The grim fact is that this damage is mostly irreversible.

Over 2000 new cases are diagnosed each day; however, much can be done both to delay and prevent the development of the most common type of diabetes—type 2—that has reached epidemic proportions in the last decade.

There are two main types of diabetes

■ Type I diabetes

Formerly called "juvenile" diabetes because it affects mostly children and young adults. It is probably an auto-immune disease, often following a viral infection. No evidence that it is increasing. Patients need insulin for life, and complications are common after a few decades. Insulin production is greatly reduced or absent. Type 1 diabetes accounts for 5-10 percent of all cases.

■ Type 2 diabetes

About 90-95 percent of all diabetes. Glucose is produced in normal or even high amounts by the pancreas, but the cells in the body do not respond to it well; they have become "insulin resistant." Most cases of type 2 diabetes have developed in middle age and beyond and it was called—up until now—"maturity onset diabetes." Alarmingly, there is presently an epidemic rise in type 2 diabetes in much younger age groups. Pediatricians are shocked to see young children develop this type, almost unheard of a decade ago. Our kids are becoming chubby (or downright fat) and are sedentary, spending much of their time with TV and computer games. Physicians are seeing the biggest increase—of at least 50 percent—in people in their 30s and 40s.

Symptoms of diabetes

The "big three" are: increased thirst and urination (water is required to dilute the excess sugar spilled into the urine), plus loss of weight despite being hungry. Other symptoms are: blurred vision, fatigue, headache, irritability, tingling or numb hands and feet, and cuts and sores that do not heal.

Many factors, especially genetic (more prevalent in first-degree relatives), are also involved. Diabetes is more common in Hispanics and African Americans. The main thing to consider now is this: **Obesity has the same relationship to diabetes that smoking has to lung cancer.** Lack of exercise also has a strong relationship to the development of type 2 diabetes. We are a nation of obese (at least 20 percent above your ideal body weight), inactive people. Almost a third of Americans get no regular exercise whatsoever.

The purpose of this article is not how to treat diabetes once it has been diagnosed. A team of physicians, nurses, dietitians, and diabetes-education specialists must guide this lifelong, complicated management. We need to learn how best to prevent the *development* of type 2 diabetes.

Here is an easy way to understand to understand the basics of how type 2 diabetes develops:

The pancreas has just so much insulin it can produce. Say the standard 150-pound (70 kilogram) man is doing just fine controlling his blood sugar for a number of years. If he balloons his weight up to 212 pounds, his metabolism becomes overloaded. Maybe he can handle a meal of 700 calories, but a huge meal of 1300 calories followed by a heavy, sugary dessert puts a heavy strain on his insulin production. If this pattern continues, eventually "fatigue" sets in and the cells "stall" and no longer respond to insulin—they become "insulin resistant." Without insulin, cells are starved for sugar, blood sugar rises, and full-blown diabetes develops.

This same man may easily handle a *well-balanced* meal of 500 calories, but a jolt of 500 calories of a sugary meal causes a surge of insulin attempting to lower the blood sugar spike. By well balanced, we mean in the proportions recommended by the Food Guide Pyramid.

Continued ☞

Dr. Stoutt is a partner in the Springs Pediatrics and Aviation Medicine Clinic, Louisville, Ky., and he has been an active AME since 1960. No longer an active pilot, he once held a commercial pilot's license with instrument, multi-engine, and CFI ratings.

Too much attention has been given to the *glycemic index*. This is a measure of how rapidly some carbohydrates are absorbed, compared with pure glucose. The higher the index, the faster the food is absorbed. Some examples are refined white bread, mashed potatoes, white rice, cornflakes, pasta, carrots, and bananas. A meal heavily loaded with high-glycemic foods certainly puts stress on the pancreas, but the concept is not of real practical value. All carbohydrates are eventually changed to glucose. There is no problem if high-glycemic foods are only a part of an otherwise well-balanced meal. No one has made a "fatty index" and listed lard, butter, and gravy as high fat foods. The main point is to eat reasonable, well-proportioned meals.

So, don't expect the pancreas to function for a long time overloaded. It does not like heavy lifting.

Table 1 shows a sound meal plan for this 150-pound man to maintain his weight (roughly 2200 calories) or to lose weight (1500 calories) and at the same time to utilize insulin sensibly. (This same diet would work for just about *any medical condition*, such as coronary heart disease). It is an excellent plan for anyone wanting to lose weight safely. The calories are only estimates—no one counts calories meticulously.

With both of these diet plans, the caloric load is spread out evenly. No periods of ravenous hunger. Good breakfast to start the metabolism. If you are a bit sleepy after lunch, good; your body is saying "too much." So, maybe just increase the afternoon snack; then you won't be so hungry at supper. (Peanuts are a great snack because they are filling and slowly absorbed.)

TABLE 1. DIETS FOR WEIGHT LOSS OR MAINTENANCE

Meal	1500 Calorie Diet	2200 Calorie Diet
Breakfast	400	600
Mid-morning snack	100	100
Lunch	400	700
Afternoon snack	100	100
Supper	400	600
Bedtime snack	100	100

All this makes sense. A four-cylinder car can't pull a house trailer. Your mother can't carry a 50-pound bag of potting soil, but she might easily carry a series of 10-pound bags. By the same analogy, your pancreas can't be abused year after year without calling it quits.

The basic plan of preventing and treating diabetes is *diet and exercise*. Exercise not only burns calories to help with weight reduction, but also *makes cells more sensitive to insulin*, increasing their ability to use glucose. The ideal is to be "lean and mean." Eighty-five percent of diabetics are fat. Ten to 15 percent of obese older people will develop diabetes.

Myths about diabetes:

√ **Sugar causes diabetes**. False. Sugar, in an excessive amount with other foods, causes obesity. Obesity is the number one cause of diabetes.

√ **The "diabetic diet."** There is no such thing. Diabetics eat the same foods as anyone else. Their diet is just more carefully selected and the meals balanced. Diabetics need not shop in the health food department (whatever this is) in the supermarket.

√ "**Mild diabetes**" or "a touch of the sugar" **All diabetes is serious.** This is like saying a *touch of pregnancy*.

√ **Diabetics crave sugar**. No more so than anyone who has a "sweet tooth."

√ **Diabetics may not have any alcoholic drinks**: False. The same rule applies as for all adults: One drink a day for women, two for men. But, not on an empty stomach.

Here are some superb Web sites to complement your knowledge of diabetes, diet, and exercise:

- www.diabetes.org (The American Diabetes Association)
- www.eatright.org (The American Dietetic Association)
- www.physsportsmed.com (*The Physician and Sportsmedicine*)

This series of articles on lifestyle for pilots first began in the *Bulletin* three-and a-half years ago. This article summarizes it all. If you heed the dangers of obesity and how it contributes to the development of type 2 diabetes, you will enjoy a richer, more productive life. An important side effect is that you will probably maintain your medical without any prolonged absence from flying.

Yours for good health and safe flying,

Glenn Stoutt

Note: The views and recommendations made in this article are those of the author and not necessarily those of the Federal Aviation Administration.

PEARLS & FACTOIDS

☞ There are more than 4,000 FBOs ("fixed-base operators" for the earthlings) in the United States.

☞ The Archives of Internal Medicine in 1998 reported a study of 802 men, aged 64-84, showing a definite association between physical exercise and reduced death from cardiovascular disease. The most striking benefit was a reduction in stroke death.

☞ The difference between genius and stupidity is that genius has its limits.

☞ 10% of all cancer deaths are from cancer of the colon or rectum. Fruits and vegetables contain *phytochemicals*—much like vitamins —that help prevent cancer.

☞ Forget all the controversy about the effect of salt on high blood pressure. The American Heart Association continues to say go light on the salt. The prevailing medical thinking is that most cases of hypertension are worsened by a failure of the kidneys to excrete enough sodium (from salt).

☞ A mind is like a parachute, not useful unless it is open.

☞ The number one food craving in the USA is chocolate; close behind is pizza.

☞ Women who wear high heels are prone to developing osteoarthritis of the knee. Very painful, sometimes making walking almost unbearable. Save high heels for special occasions when you want to look great. Also, who wants bunions?

Federal Air Surgeon's Medical Bulletin 2000 Index of Stories

A Reference Guide to Articles Published in 2000

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